

REMARKS

Claims 29-32, 34-39, 41-47 and 49-54 are pending in this application. Claims 29, 34, 36, 41, 44 and 49 have been amended. Claims 33, 40 and 48 have been cancelled and their limitations have been incorporated in amended independent claims 29, 36 and 44. No new matter has been introduced.

As previously noted during the prosecution of the pending claims of this application, Applicant reemphasizes that the limitation “electropolished patterned metal layer” is not a product-by-process limitation, as the last Office Action mistakenly asserts, but rather a *resulting structure* having distinct and defined characteristics.

In R2 Medical Systems, Inc. v. Katecho, Inc., which involved a claim reciting that one element be “affixed” to another, the court found that “‘affixed’ means ‘to be attached physically.’” R2 Medical Systems, Inc. v. Katecho, Inc., 931 F.Supp. 1397, 1425-26 (N.D. Ill. 1996). The Court held that “[T]he terms of the claims do not indicate that ‘affixed’ refers to a process by which the stannous chloride is bound to the conductive plate, but only that it refers to the result of that process.” Id. (quoting CVI/Beta Ventures, Inc. v. Custom Optical Frames, Inc., 893 F. Supp. 508, 519 (D. Md. 1995) (limitation that element be in ‘work-hardened pseudoelastic metallurgic state’ is directed to the structure, not the process, of manufacture)).

In Hazani v. U.S. Int’l Trade Comm’n, which involved patent claims to a memory cell comprising a conductive plate having a surface that was “chemically engraved,” the Federal Circuit also held that the claims were “pure product claims” and not product-by-process claims. Hazani v. U.S. Int’l Trade Comm’n, 126 F.3d 1473, 44 USPQ2d 1358 (Fed. Cir. 1997). The Federal Circuit reasoned that the “chemically engraved” limitation, read in context, described the product more by its structure rather than by the process used to obtain it. Id.

In the present case, claims 29, 36 and 44 recite the limitation “electropolished

patterned metal layer” which is a structural limitation and not a product-by-process limitation. An “electropolished patterned metal layer,” like the “chemically engraved” plate of Hazani, is a *resulting structure* having distinct and defined characteristics. Thus, in view of R2 Medical Systems and Hazani, the limitation “electropolished patterned metal layer” is not a product formed by a particular process.

Claims 29, 35-36, 42 and 43 stand rejected under 35 U.S.C. §102(e) as being anticipated by Jeng et al. (U.S. Patent No. 6,184,081) (“Jeng”). This rejection is respectfully traversed.

The claimed invention relates to an electropolished patterned metal layer formed as part of a semiconductor device. As such, amended independent claim 29 recites a “semiconductor device” comprising “an electropolished patterned metal layer . . . having a thickness of about 50 to 300 Angstroms.” Amended independent claim 36 recites a “memory cell” comprising “a conductive layer” and “an electropolished patterned metal layer provided over said conductive layer, said electropolished patterned metal layer having a thickness of about 50 to 300 Angstroms.” Amended independent claim 36 also recites “a transistor in electrical communication with said electropolished patterned metal layer” including a gate and a source/drain region and “a capacitor including an electrode . . . being in electrical contact with said source/drain region.”

Jeng relates to a method of forming an upper plate of a capacitor “simultaneously with the opening of bit line, and substrate, contact hole openings, using the same photolithographic mask and dry etching procedures.” (Col. 1, lines 62-65). For this, Jeng teaches “isolating a polysilicon plate structure (23a), during an isotropic RIE cycle, also creating an undercut polysilicon region, in the contact holes (28a, 29a), which are opened simultaneously during the upper plate (23b) formation.” (Abstract; Figures 6-8). Jeng also teaches that the upper capacitor plate (23b) is formed of polysilicon and that the lower capacitor plate is formed of a polysilicon layer (19) and a conductive layer (20).” (Col. 4, lines 21-38; Figure 8). Jeng emphasizes that the conductive layer (20) may be “an

in situ doped polysilicon layer, a tungsten layer, or a titanium nitride layer . . . deposited to a thickness between about 500 to 1500 Angstroms.” (Col. 4, lines 21-38; Figure 8).

Jeng does not teach or suggest the limitations of the claimed invention. Jeng does not disclose “an *electropolished patterned metal layer*” having “a thickness of *approximately 50 to 300 Angstroms*,” as amended independent claims 29 and 36 recite (emphasis added). As noted above, Jeng teaches that conductive layer 20 is “an in situ doped polysilicon layer, a tungsten layer, or a titanium nitride layer,” and not an electropolished patterned metal layer, as in the claimed invention. Jeng also teaches that the conductive layer 20, which would arguably correspond to the metal layer of the claimed invention, is “deposited to a thickness between about 500 to 1500 Angstroms” (col. 4, lines 33-36; figure 4) and not to “a thickness of approximately 50 to 300 Angstroms,” as in the claimed invention. For at least these reasons, Jeng fails to disclose all limitations of amended independent claims 29 and 36, and withdrawal of the rejection of these claims 29, 35-36, 42 and 43 is respectfully requested.

Claims 30-32, 34, 37-39, 41, 44-47 and 49-54 stand rejected under 35 U.S.C. §103(a) as being obvious over Jeng in view of McClure et al. (U.S. Patent Number 6,027,860) (“McClure”). This rejection is respectfully traversed.

McClure relates to a “method of forming a structure by redepositing a starting material on sidewalls of a foundation during an etch of the starting material.” (Abstract). McClure teaches that the starting material to be redeposited may be “platinum, conductive oxides, and polysilicon.” (Col. 3, lines 33-35).

The subject matter of claims 30-32, 34, 37-39, 41, 44-47, and 49-54 would not have been obvious over Jeng in view of McClure. Indeed the Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must

teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355, 47 U.S.P.Q.2d 1453, 1456 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573, 37 U.S.P.Q.2d 1626, 1630 (Fed. Cir. 1996).

In the present case, neither Jeng nor McClure, whether considered alone or in combination, teach or suggest the limitations of claims 30-32, 34, 37-39, 41, 44-47 and 49-54. Jeng is silent about “an electropolished patterned metal layer,” much less about “an electropolished patterned metal layer” having “a thickness of about 50 to 300 Angstroms,” as amended independent claims 29 and 36 recite. As noted above, Jeng teaches “an undercut polysilicon region in the contact holes (28a) (29a) which are opened simultaneously during the upper plate (23b) formation” (Abstract; Figures 6-8), and not “an electropolished patterned metal layer” having “a thickness of about 50 to 300 Angstroms,” as in the claimed invention. Similarly, McClure is silent about a patterned metal layer, much less about “an electropolished patterned metal layer” of a specific thickness, as in the claimed invention. The crux of McClure is a “redeposited” starting conductive material, which may be part of a capacitor structure, and not “an electropolished patterned metal layer” having “a thickness of about 50 to 300 Angstroms,” as in the claimed invention.

In addition, a person of ordinary skill in the art would not have been motivated to combine the teachings of McClure with those of Jeng because no suggestion or motivation to combine the references exists. Courts have generally held that, to establish a *prima facie* case of obviousness, “[I]t is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor.” Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934, 15 U.S.P.Q.2d 1321, 1323 (Fed. Cir. 1990). This way, “the inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole for which patentability is claimed.” Hartness Int’l, Inc. v. Simplimatic Engineering Co., 819 F.2d 1100, 1108, 2 U.S.P.Q.2d 1826, 1832 (Fed. Cir. 1987). Accordingly, a

determination of obviousness “must involve more than indiscriminately combining prior art; a motivation or suggestion to combine must exist.” Pro-Mold & Tool Co., 75 F.3d at 1573.

As noted above, the crux of Jeng is a method of forming a capacitor upper plate “simultaneously with the opening of bit line, and . . . contact hole openings.” (Col. 1, lines 62-65). For this, Jeng teaches a sequence of processing steps for the formation of polysilicon upper plate (23b) and of the contact holes (28a), (29a). (Abstract; Figures 6-8). In contrast, the crux of McClure is a method of “redepositing a starting material on sidewalls of a foundation during an etch of the starting material” (abstract), with the etch creating “particles or portions of each layer which are then deposited on sidewalls of the foundation.” (Col. 1, lines 44-46). Thus, it is clear that the only structure that Jeng and McClure have in common is the semiconductor wafer on which their respective methods take place. Accordingly, a person skilled in the art would not have been motivated to combination the two references, and withdrawal of the rejection of claims 30-32, 34, 37-39, 41, 44-47 and 49-54 is respectfully requested.

A marked-up version of the changes made to the claims by the current amendment is attached. The attached page is captioned “Version with markings to show changes made.”

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Markings to Show Changes Made to Claims

29. (Amended) A semiconductor device comprising:

a substrate; and

an electropolished patterned metal layer provided over said substrate, said electropolished patterned metal layer having a thickness of approximately 50 to 300 Angstroms.

34. (Amended) The semiconductor device of claim [33] 29, wherein said [platinum] electropolished patterned metal layer has a thickness of approximately 100 Angstroms.

36. (Twice amended) A memory cell comprising:

a conductive layer provided over a semiconductor substrate;

an electropolished patterned metal layer provided over [a semiconductor substrate] said conductive layer, said electropolished patterned metal layer having a thickness of approximately 50 to 300 Angstroms;

a transistor in electrical communication with said electropolished patterned metal layer, including a gate fabricated on said semiconductor substrate and including a source/drain region in said semiconductor substrate disposed adjacent to said gate; and

a capacitor including an electrode, said electrode being in electrical contact with said source/drain region.

41. (Amended) The memory cell of claim [40] 36, wherein said [platinum] electropolished patterned metal layer has a thickness of approximately 100 Angstroms.

44. (Amended) A processor-based system comprising:

a processor; and

an integrated circuit coupled to said processor, at least one of said integrated circuit and processor comprising an electropolished patterned metal layer having a thickness of approximately 50 to 300 Angstroms provided over a substrate.

49. The processor-based system of claim [48] 44, wherein said [platinum] electropolished patterned metal layer has a thickness of approximately 100 Angstroms.